fungus the oogonial hypha pushes its way entirely through the antheridium, and, after emerging on the side opposite to the point of entrance, enlarges to form the oogonium. This unusual process, together with the subsequent events in the formation of the oospore, has now been more fully investigated by MURPHY,[9] whose cytological evidence bears out the observations of PETHYBRIDGE. The antheridia and oogonia are found to arise on different branches of the mycelium. During the penetration of the antheridium by the oogonial incept no fusion of the cytoplasm of the two organs occurs. After its emergence the oogonial hypha develops into a more or less spherical multinucleate oogonium whose stalk passes through the antheridium. When the sexual organs have reached their full size, about two-thirds of the nuclei in the antheridium and in the oogonium degenerate. The remaining nuclei in both organs then divide once mitotically and simultaneously. During the division the nuclei of the oogonium are arranged in a hollow sphere, with the exception of one, which remains in the center. Immediately after the division the protoplasm of the oogonium separates into a vacuolate hyaline ooplasm and a denser periplasm. In the oogonium, and probably in the antheridium also, all the nuclei but one degenerate. During this period a prominent receptive papilla protrudes from the base of the oogonium into the antheridium. When the receptive papilla is withdrawn, the fertilization tube grows into the oogonium at the same point and discharges one nucleus and the greater part of the cytoplasm of the antheridium into the oogonium. With the completion of this process most of the periplasm has disappeared and the oospore is surrounded by a thin membrane with the last vestiges of the degenerating nuclei appressed against its outer surface. The fusion of the two nuclei does not take place until the thickened oospore wall has been completed.—H. HASSELBRING.

Action of neutral salts on acid inversion of cane sugar.—LEBERT[10] has studied the action of neutral salts on the acid inversion of cane sugar. His results furnish him a basis for a chemical explanation of certain difficulties sometimes encountered when attempts are made to invert cane sugar by means of weak acids or stronger acids in quantity just sufficient to effect the inversion. Solutions in which it is desired to invert cane sugar are rarely free from neutral salts, especially sodium acetate left in the solution after clearing with lead acetate and removing the excess of lead with sodium carbonate or sulphate. If the hydrolysis is effected by a relatively large quantity of strong acid, as in the Clerget method, the presence of a small amount of salt is of little consequence, since the H ions are in great excess. If organic acids are employed, the presence of their sodium or potassium salts will retard the rate of inversion,

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[9] MURPHY, P. A., The morphology and cytology of the sexual organs of *Phytophthora erythroseptica* Pethyb. Ann. Botany **32**:115–153. *pls. 3.* 1918.

[10] LEBERT, M., Action des sels neutres sur l'inversion du sucre par les acides. Rev. Gen. Botanique **30**:241–244. 1918.

the decrease in the rate depending upon the strength of the acid; the weaker the the acid the greater the inhibiting action of its salt. The action of acetic acid is completely paralyzed by the presence of sodium acetate equivalent to the proportion of the acid. The effect of a salt other than the salt of the acid used for the inversion depends upon the relations established between the acid and the salt. An example would be HCl in the presence of sodium acetate; NaCl and acetic acid are formed. If the acetate is present in sufficient quantity, all of the HCl is replaced by acetic acid, and if the acetate is still in excess, we have inversion by acetic acid in the presence of its sodium salt, in which case the hydrolysis is always inhibited. The author offers a similar explanation for a situation reported by Davis and Daish. They found that 2 per cent citric acid was sufficient to invert a solution of cane sugar by boiling 10 minutes, but it was without effect in the presence of a certain quantity of sodium acetate. The citric acid reacted with the sodium acetate, giving sodium citrate and liberating an equivalent amount of acetic acid, the action of which was paralyzed by its sodium salt still present in the solution.—Charles O. Appleman.

Effect of different oxygen pressures on carbohydrate metabolism of sweet potatoes.—The experiments reported by Hasselbring[11] in this paper were designed primarily to effect a further separation of the various steps in the transformation of starch to sugar in sweet potatoes. For this purpose different oxygen pressures were employed. When the sweet potatoes are killed under a gas pressure of 5 atmospheres, starch hydrolysis is greatly depressed or inhibited. In the living potatoes starch hydrolysis and cane sugar formation proceeded in the absence of oxygen in the same manner as in air or in an atmosphere of oxygen. Cruickshank working with barley seed, and Boysen-Jensen working with germinating barley and peas, found that cane sugar was not formed in the absence of oxygen. These investigators conclude that the presence of oxygen is one of the necessary conditions for cane sugar formation, but since this was not found to be the case with sweet potatoes, the conclusion is not of general applicability.

Anaërobic respiration in sweet potatoes consumes, in a given period of time, a greater quantity of material than is consumed by normal respiration. The energy derived from a given mass of material is less in anaërobic than in normal respiration. These facts, coupled with the observation that cane sugar is formed with equal facility under anaërobic and aërobic conditions, lead the author to believe that his experiments in a general way support the Boysen-Jensen theory that the respiratory processes furnish the energy for the synthesis of cane sugar. In the case of the sweet potato this energy could be furnished by anaërobic respiration.

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[11] Hasselbring, Heinrich, Effect of different oxygen pressures on the carbohydrate metabolism of the sweet potato. Jour. Agric. Research 14:273–284. 1918.